

# Nucleonica Overview

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Germany



# What is Nucleonica?

## Who is Nucleonica aimed at?

## How can Nucleonica help you?

# Nucleonica Architecture & Logical Structure...

## Nucleonica Knowledge Objects (wiki, blog, forum...)

## NUCLEONICA as a platform for scientific applications development

## Key Advantages of Nucleonica



# What is Nucleonica?

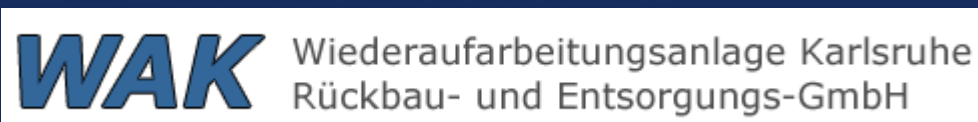
- As a result of recent developments on issues such as energy security and sustainability, nuclear safety, security, and non-proliferation, and protection of the environment, we are witnessing a resurgence of interest in nuclear power and the nuclear sciences in general.
- In order to support this renewed interest in the nuclear sciences, we will need a nuclear skills renaissance and it is within this context that the Nucleonica nuclear science web portal ([www.nucleonica.com](http://www.nucleonica.com)) has been developed.
- With its roots in the traditional paper-based Karlsruhe Nuclide Chart, Nucleonica has grown to become the leading online resource in the nuclear sciences. Nucleonica is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.



## Who is Nucleonica aimed at?

- Nucleonica is aimed at scientists, engineers and technical personnel working in the fields of nuclear power, health physics, radiation protection, nuclear and radiochemistry, decommissioning, nuclear medicine, etc. Nucleonica is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.
- It can also be used by professionals for everyday calculations, obtaining quick results in various fields of applications and testing, validating and verifying complex computer models.
- Nucleonica also provides a range of consultancy services and industry cooperations. Examples of some recent studies include an analysis of the handling problems arising in the dismantling of radioactive sources, a decommissioning study of neutron sources, shielding analysis for a minor actinide laboratory, and a comparison of the radiotoxicities of wastes from fission, fusion, and coal fired power stations.

# Our Customers include...



# How can Nucleonica help you?

- Nucleonica provides you with user friendly access to the latest reference data from internationally evaluated nuclear data.
- A unique feature is the wide range of validated web-based nuclear science applications for decay calculations, dosimetry & shielding, gamma spectrometry, etc.
- A variety of networking tools are provided for scientific collaboration.
- In addition Nucleonica offers a range of introductory and advanced training courses in various areas of nuclear science. One of the main aims of these courses is to contribute to establishing a safety culture among the scientists and especially the younger scientists. This safety culture is a necessary prerequisite for a general acceptance of nuclear energy worldwide.



A blue rectangular box containing the Nucleonica logo (a stylized 'n' made of small squares) and the text 'nucleonica'. Below this, the website address 'www.nucleonica.com' and the tagline 'web driven nuclear science' are displayed. At the bottom left, there are logos for the European Commission and JRC, along with a stylized 'itn' logo.



Nucleonica is already being used by thousands of scientists and students worldwide in over 92 countries. Due to its advanced IT features, user friendly and intuitive environment, the platform has recently been endorsed by the Sustainable Nuclear Energy Technology Platform ([www.snetp.eu](http://www.snetp.eu)):



*“Nucleonica plays ... an important role in making nuclear education more attractive and in building nuclear knowledge for a new generation of engineers and scientists”*

# Nucleonica...

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 ... web driven nuclear science

Wednesday, September 23, 2009

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## Nucleonica - web driven nuclear science



### NUCLEONICA HOT TOPICS

**>> New Nucleonica Training Course... ITRAC-2**  
August 17, 2009

The 2nd Advanced Training Course on Illicit Trafficking and Radiological Consequences (ITRAC-2) with NUCLEONICA will take place at ITU, Karlsruhe from

**KARLSRUHE NUCLIDE CHART**  
**>> Karlsruhe Nuclide Chart special event on 9th Dec. 2008**  
Januar 09, 2009

New book now available!...for more information click link

NUCLEONICA is a new nuclear science web portal from the European Commission's Joint Research Centre. The portal provides a customisable, integrated environment and collaboration platform for the nuclear sciences using the latest Internet "Web 2.0" dynamic technology.

NUCLEONICA is aimed at professionals, academics and students working with radionuclides in fields as diverse as the life sciences (e.g. biology, medicine, agriculture), the earth sciences (geology, meteorology, environmental science) and the more traditional disciplines such as nuclear power, health physics and radiation protection, nuclear and radiochemistry, and astrophysics. It is also used as a knowledge management tool to preserve nuclear knowledge built up over many decades by creating modern web-based versions of so-called legacy computer codes.

NUCLEONICA provides "software as a service" on the web rather than through installed software, adding a greater level of stability and security and avoiding version compatibility and update problems. In addition, all NUCLEONICA's web applications are browser and operating system independent and can therefore be accessed by most web browsers.

NUCLEONICA offers the following main features:

### NUCLEAR NEWS

**N-energy benefits should not remain confined to few: PM**  
**SEP 30** Manmohan Singh today said benefits of atomic energy should not remain confined to a 'privileged few' as it was vital to meet power requirements of developing countries. [...]

**For sale: Fisherman's cottage in nature reserve (Oh, and it's next to two nuclear power stations)**  
**SEP 30** For sale: Fisherman's cottage in nature reserve (Oh, and it's next to two nuclear power stations) [...]

**Analysis: Iran plant could defer Israel strike**  
**SEP 30** JERUSALEM (AP) — It may seem counterintuitive, but the news that Iran has a second, clandestine uranium enrichment plant, and has just test-fired long-range missiles, could actually put off any plans [...]

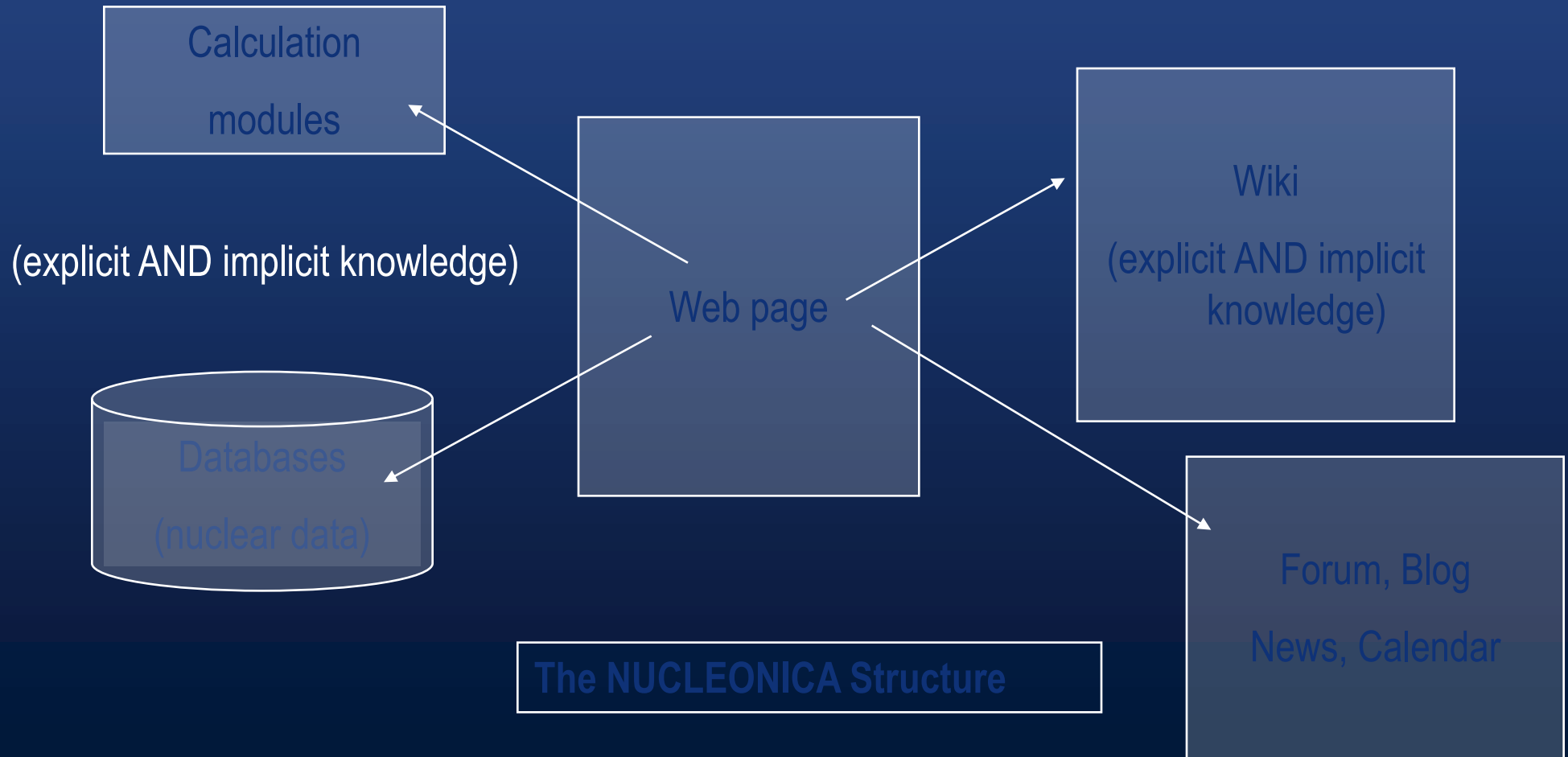
**India's allotment for nuclear parks hailed**  
**SEP 30** The US India Business Council has welcomed India's move to reserve sites for the US commercial nuclear technology and described it as a significant step towards implementing the US-India civil nuclear [...]

**Bulgaria Belene Nuclear Plant to Bring EUR 80 B over 60 years**  
**SEP** If built, the Bulgarian B...



# The NUCLEONICA Nuclear Science Portal

## Nucleonica Architecture & Logical Structure...



# Wiki, Blog, Forum, News, Conference Calendar...



## ... web driven nuclear science

ApplicationsDataKnowledgeMy PreferencesPrintHelpNew Browser

### » Nucleonica Networking

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### » Tools

- » Forum
- » Conference Calendar
- » webGraph
- » Marketplace

### » Applications Portal

- » nuclear science

### » Coming soon

- » WESPA



### » Deadline extended...Position on Gamma Spectrometry at ITU Karlsruhe

April 17, 2011

Position to develop an Web Spectrum Analyser (WESPA) for nuclear security.....

### » Nucleonica Blog

#### » Why does carbon-14 have a very long half-life?

The long half-life of C-14 is very useful in that it allows archaeologists to date ancient objects back to about 60,000 years. But why exactly is the half-life of carbon-14 so long? Other light nuclei have much shorter half-lives in the range seconds to minutes (see neighbouring nuclides in the Karlsruhe Nuclide Chart). This puzzle [...]

#### » New half-life data for 29 neutron rich isotopes

Daugas et al. (Phys. Rev. C 83, 054312, 2011) have presented new  $\beta$ -decay measurements for  $N > 40$  Mn nuclei. In total, half-lives for 29 isotopes have been determined. New data on the half-lives of Ti-61, V-64, and Fe-71 have been obtained. New data on  $\beta$ -delayed gammas rays and branching for  $\beta$ -delayed neutron emission have also [...]

#### » Eleven new heavy isotopes discovered for Z=105 to Z=117

Organessian et al (Phys. Rev. C 83, 054315 (2011) have reported the observation of 11 new heavy isotopes of elements  $Z = 105$  to  $Z = 117$ . These new isotopes have been discovered in the reaction products of  $^{249}\text{Bk} + ^{48}\text{Ca}$  reactions. Reference

#### » Presentation on Nucleonica at STAR Network of Excellence

STAR – STrategy for Allied Radioecology – is a recently launched Network of Excellence funded by the EC until the end of 2015. The STAR project will bring together experts in radioecology from all over Europe to develop the future directions of radioecology. This meeting was held on 17-20 May 2011 in Helsinki in [...]

#### » ITRAC-3 Training Course proceedings now online..

The proceedings of the ITRAC-3 training course on Illicit Trafficking and Radiological Consequences are now online. This course took place on the 11-13 May in Karlsruhe. Guest speakers included Dr. Andrey Berizov from the IAEA's Safeguards department. ITU speakers included K. Mayer, M. Wallenius, J. Galy, J. Zsigrai, and E. Hrncsek. From the Nucleonica team [...]


### Welcome, Joseph

My SettingsMy ProfileMy Community


### » My Community Events

- You have 0 new messages
- You have 0 new contact list requests

### » Recent Nucleonica Members



Gerald Pechoc



Christos Maramathas



Carlos Murua



Mohamadreza Bakht

### » Nucleonica Forum

#### » Decay engine of Pu-241

U-237 is a daughternuclide of Pu-241 and it has a branching ratio of 2.46E-5. But this daughternuclide has no appearance in the decay engine of...

#### » ITRAC-3 Karlsruhe: Please give your feedback here!

Dear ITRAC-3 participants! We would like you to give your opinions and remarks on the training course in this thread.

#### » Calculating energy loss of 2 MeV electrons thru different materials

I have a 2 MeV electron accelerator that is used for pulse radiolysis

discussion

edit

history

delete

move

watch

Decay Engine

file for this document

Contents [hide]

Radioactive Decay

Radioactive Decay Chains

Divergent and Divergent Branches

Radioactive Equilibrium

1 ( $t_1 \gg t_2$ ): Secular Equilibrium:

2 ( $t_1 < t_2$ ): Transient Equilibrium

3 ( $t_1 < t_2$ ): The Half-life of the Parent is Shorter than that of the Daughter

4 ( $t_1 \approx t_2$ ): The Half-lives of the Parent and Daughter are Similar

Decay Engine Module

Interface

ons

ph

ails

s

W

Radioactive Decay

Radioactive decay is a random process. It is not possible to predict when a particular nucleus will decay. However, we can evaluate the probability that a nucleus will decay in a time interval. The first person to do this was identified by Rutherford, is

$$-kQ$$

# The Nucleonica Blog...

## Why does carbon-14 have a very long half-life?

May 30th, 2011

by Joseph Magill

The long half-life of C-14 is very useful in that it allows archaeologists to date ancient objects back to about 60,000 years. But why exactly is the half-life of carbon-14 so long? Other light nuclei have much shorter half-lives in the range seconds to minutes (see neighbouring nuclides in the Karlsruhe Nuclide Chart). This puzzle has recently been resolved in a paper just published in Phys. Rev. Letts.

### References

P. Maris, J. Vary, P. Navrátil, W. Ormand, H. Nam, D. Dean. Origin of the Anomalous Long Lifetime of  $^{14}\text{C}$ . Physical Review Letters, 2011; 106 (20) DOI: 10.1103/PhysRevLett.106.202502, [pdf](#)

See also [Karlsruhe Nuclide Chart](#)

Bookmark with:



Posted in [Karlsruhe Nuclide Chart](#), [Nucleonica](#) | [Comments](#)

## New half-life data for 29 neutron rich isotopes

May 26th, 2011

### Search

### About this blog

What's New in Nucleonica... Blog - News from the Nucleonica Team

### Subscribe to the Blog

You can stay up to date with Nucleonica Blog via these feeds.

[Subscribe via RSS](#)

### Categories

[Karlsruhe Nuclide Chart](#)  
[Nucleonica](#)

### Nuclear News

[Japan: green tea exports banned due to high radiation levels](#) June 3, 2011

The Japanese government has banned shipments of green tea leaves in four regions after high levels of radioactive caesium were found. [...]

[Germany: Hidden Fallout from Sudden Nuclear Shutdown](#)

# The Nucleonica Forum...



User Name

Log in

Remember Me?

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Register

Advanced Search

... web driven nuclear science

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If this is your first visit, be sure to check out the [FAQ](#) by clicking the link above. You may have to [register](#) before you can post: click the register link above to proceed. To start viewing messages, select the forum that you want to visit from the selection below.

[+ Post New Thread](#)

Threads 1 to 20 of 95

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Last

Forum: General

General comments

Forum Tools

Search Forum

| Title / Thread Starter   | Replies / Views           | Last Post By               |
|--|---------------------------|----------------------------|
|  <b>ITRAC-3 Karlsruhe: Please give your feedback here!</b><br>jmagill 1 2         | Replies: 13<br>Views: 584 | Edmolf<br>Today 12:37      |
|  <b>Decay engine of Pu-241</b><br>Anika   | Replies: 1<br>Views: 29   | HotCells<br>01-06-11 12:20 |
|  Calculating energy loss of 2 MeV electrons thru different materials<br>patcausey | Replies: 2<br>Views: 350  | XRay<br>01-04-11 14:24     |
|  How to use decay engine for spontaneous fission of Cf-252?<br>jedlovec           | Replies: 6<br>Views: 774  | jedlovec<br>18-02-11 19:29 |
|  Radioactive decay calculations and spontaneous fission<br>NUWS                  | Replies: 1<br>Views: 525  | XRay<br>17-02-11 16:17     |
|  Am-242m Gamma Ray Dose in a MA mixture unexpected!<br>Vincenzo Romanello       | Replies: 1<br>Views: 348  | HotCells<br>03-02-11 13:30 |
|  Half-life of Mn60?<br>NUWS   | Replies: 1<br>Views: 216  | HotCells<br>02-02-11 13:32 |
|  Decay Engine<br>qms85  | Replies: 1<br>Views: 315  | jmagill<br>25-01-11 15:41  |




# The Nucleonica Nuclear News...

The Nuclear News consists of a news feed via a WEB-crawler developed by colleagues of the JRC. This crawler, based on a list of web sites and keywords, generates an RSS news feed from which a news page can be generated. The Keywords are used to create categories. The alerts will be displayed via category when requested by the user. ITU will provide the crawler application and instructions.


Nuclear Media Monitor

Options

 [Japan staff exceed radiation limit](#)


The operator of Japan's crippled nuclear power plant said two workers have exceeded a radiation exposure limit for men.

Source: argus Language: EN Date: Fri, 03 Jun 2011 14:27:00 +0200

 [EBRD supports green energy generation in the Baltics \[EBRD - News an..](#)


[ Vrijdag 3 juni 2011 | European Bank for Reconstruction and Development ] The EBRD is providing a loan to AS Graanul Invest, a leading Estonia-based wood pellet producer, that will boost the volume of green energy generated in the Baltic States and which continues the Bank's

Source: nieuwsbank Language: EN Date: Fri, 03 Jun 2011 14:26:00 +0200

 [Mutant rabbit born near Fukushima plant](#)


The birth of a white rabbit with no ears not far from the damaged Fukushima power plant in Japan has sparked fear in locals.

Source: rt Language: EN Date: Fri, 03 Jun 2011 14:21:00 +0200

 [Iran refutes IAEA military claims](#)


Iran dismisses as "unfounded" military allegations leveled by the International Atomic Energy Agency (IAEA), saying there is no evidence that the country's nuclear activities pursue military aims.

Source: trendnews-az Language: EN Date: Fri, 03 Jun 2011 14:16:00 +0200

 [Iran vows 'severe' reaction to West](#)


The Islamic Republic will produce a severe reaction to European countries' unilateral sanctions.

Source: trendnews-az Language: EN Date: Fri, 03 Jun 2011 14:16:00 +0200

 [E coli food-poisoning outbreak shows how fear can triumph over reality](#)


The gulf between our fears and the facts of this E coli story may put us in greater danger, says risk consultant David Ropeik The outbreak of foodborne disease in Europe offers an interesting lesson in the psychology of risk perception. To be sure, the danger from this outbreak is real .

Source: guardian Language: EN Date: Fri, 03 Jun 2011 14:13:00 +0200

 [China is drawing lessons from Fukushima crisis](#)

China is drawing lessons from Japan's Fukushima nuclear crisis and will enhance the safety level for the construction and operation of its nuclear power plants.

Source: chinadaily Language: EN Date: Fri, 03 Jun 2011 13:45:00 +0200

 [UxC and Nuclear.Ru to partner on the CIS market](#)

# The Conference Calendar...

**Nucleonica Networking**

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**Applications Portal**

- » nuclear science

**Coming soon**

- » WESPA



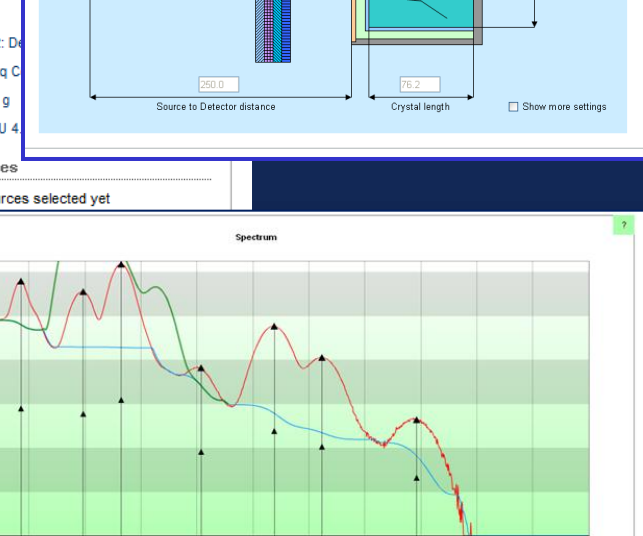
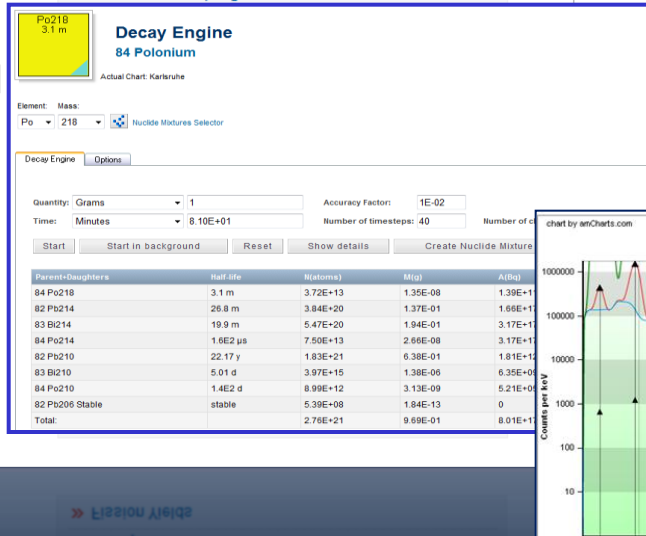
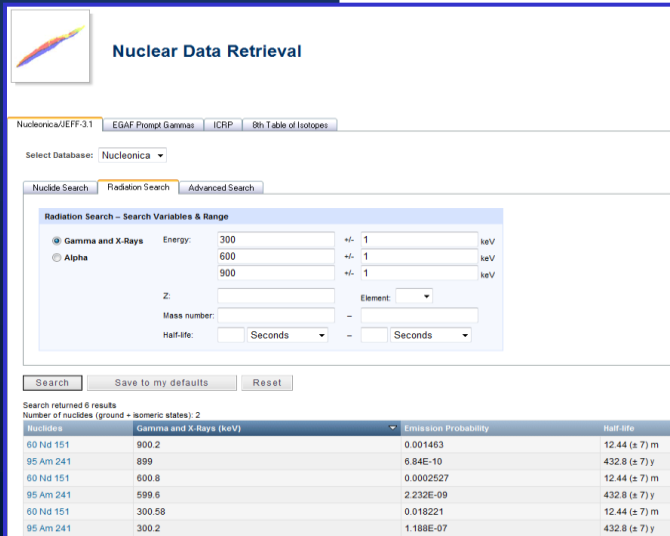
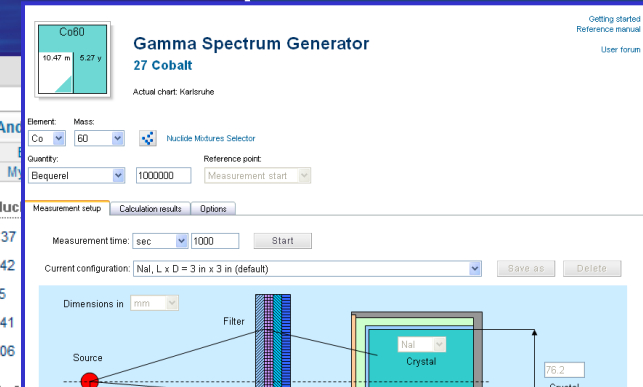
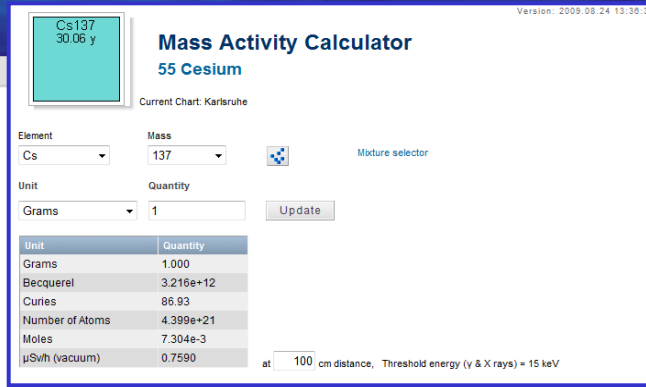
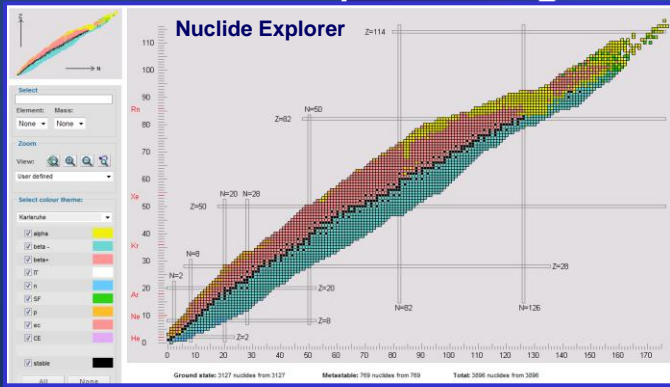


## Nucleonica Conference Calendar

Conferences
My Conferences

| Mai 2011  |   |   |  |  |                            |  |
|---|---|---|--|--|----------------------------|--|
| Montag  | Dienstag  | Mittwoch  | Donnerstag   | Freitag  | Samstag                    | Sonntag  |
| 25  | 26  | 27  | 28   | 29   | 30                         | 1  |
| 2<br>ICAPP Nice                                 | 3<br>ICAPP Nice   | 4<br>ICAPP Nice   | 5<br>ICAPP Nice  | 6  | 7                          | 8  |
| 9   | 10  | 11<br>ITRAC-3 /<br>Nucleonica   | 12<br>ITRAC-3 /<br>Nucleonica  | 13<br>ITRAC-3 /<br>Nucleonica                        | 14                         | 15<br>NESTet 2011,<br>Prague, 15-18<br>May 2011    |
| 16<br>NESTet 2011,<br>Prague, 15-18<br>May 2011 | 17<br>Jahrestagung<br>Kerntechnik,<br>Berlin<br>ENYGF 2011<br>Prague<br>NESTet 2011,<br>Prague, 15-18<br>May 2011 | 18<br>STAR project<br>Norway<br>Jahrestagung<br>Kerntechnik,<br>Berlin<br>ENYGF 2011<br>Prague<br>NESTet 2011,<br>Prague, 15-18<br>May 2011 | 19<br>STAR project<br>Norway<br>Jahrestagung<br>Kerntechnik,<br>Berlin<br>ENYGF 2011<br>Prague | 20<br>STAR project<br>Norway<br>ENYGF 2011<br>Prague | 21<br>ENYGF 2011<br>Prague | 22<br>Reactor<br>Dosimetry<br>ENYGF 2011<br>Prague |
| 23<br>Reactor<br>Dosimetry                      | 24<br>Reactor<br>Dosimetry  | 25<br>Reactor<br>Dosimetry  | 26<br>Reactor<br>Dosimetry   | 27<br>Reactor<br>Dosimetry                           | 28                         | 29   |
| 30  | 31  | 1   | 2  | 3  | 4<br>Scotland              | 5<br>Scotland                                      |
| Dienstag, 12. Juni<br>2012                      | Pfennig / ITU contract expires  |   |  |  |                            |  |

# Nucleonica's unique feature: Web-based Validated Nuclear Science Applications



# Build your applications on the NUCLEONICA platform...

- Currently NUCLEONICA consists of individual modules
- Modules can be “combined” for batch processing through the NUCLEONICA scripting language
- Open up NUCLEONICA to external developers
  - checklist of tools required:
    - access to the NUCLEONICA databases
    - a testing environment where the developer and the NUCLEONICA team can test new application
    - an upload facility whereby the developer can upload the application to the NUCLEONICA platform

Recent Example: development of an *In silico* dosimetry module



# Conclusions: Key Advantages of Nucleonica

- Keep informed with the latest news on nuclear issues
- Use internationally evaluated nuclear data in your work
- Extensive range of validated nuclear science applications
- Manage all your data in a single browser-based system and keep track of your recent activities
- Prepare a lecture or a training course with Nucleonica materials (graphics. etc.)
- Prepare publication quality scientific graphs
- Stay in contact with your colleagues from previous employment, workshops or conferences
- Meet scientists from your areas of interest and build up an international contact list and represent yourself and your Institute/Organisation in the international science community

